

Age of Acquisition (AOA) on Verbal Memory

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Abstract

Previous research showed a relationship between music learning and enhanced cognitive skills. This study examined the impact of various music learning conditions on verbal memory. Twenty-three highly-trained musicians, 20 amateur musicians and 45 undergraduate controls were tested on various musical abilities and verbal memory. Results showed that when taking into account general education, the three groups differed significantly in their melodic organisation, temporal perception, incidental music memory and verbal memory. However, only the highly-trained musicians performed significantly better than the controls in both music and immediate verbal memory recall. Interestingly, early music learners who started learning music at age 7 or before did not outperform the late learners in both music and verbal memory. Musicians who were currently learning music were better in musical abilities but not verbal memory. The results reinforced previous studies showing a relationship between high music qualification or professional attainment and verbal memory.

Introduction

An overview of the literature suggests that the effect of music training on enhanced verbal memory seems to be more apparent in participants who: (1) start to learn music at an early age (Chan, Ho, & Cheung, 1998; Hogan & Huesman, 2008; Jakobson, Lewycky, Kilgour, & Stoesz, 2008); (2) have high music attainment (Brandler & Rammsayer, 2003; Jakobson *et al.*, 2008) and (3) have long term training (Brandler & Rammsayer, 2003; Chan *et al.*, 1998). Therefore, this study examined the impact of music attainment, age of acquisition (AOA), and whether the adult participant was currently practising music or not on verbal memory.

Method

Participants

- Twenty-three highly-trained (skilled) musicians: (4 males, 19 females); aged 15-64 (mean=35.09, s.d.=16.51); had achieved at least Grade 7 in AMEB, Trinity Guildhall or Grade 8 in Royal Conservatory of Music Examination; started formal music training at age 9 or before (mean age started=6.54)
- Twenty amateur musicians: (5 males, 15 females); aged 17-52 (mean=26.9, s.d.=11.74); had music attainment < Grade 7 in AMEB or Trinity Guildhall; started formal music training at any age [range 5 to 22, with a majority started before age 13, 1 at age 22 (mean age started = 9.5)]
- Forty-five undergraduates: (12 males, 33 females); aged 17-53 (mean=31.02, s.d.=11.43); had no formal music training

Tests and Procedures

- Montreal Battery of Evaluation of Amusia (MBEA) (Peretz, Champod, & Hyde, 2003) examining melodic organisation, temporal organisation and incidental music memory.
- Verbal Paired Association subtest of the Wechsler Memory Scale (WMS).
- Questionnaire requesting demographic and music learning information to further categorise participants into: 1) early (commenced music training at age 7 or before: n=20) vs late learners (n=23); and 2) current (n=25) vs non-current (n=18) music learners.

Results

MANCOVA was performed to see if there were any significant differences between the groups on various musical abilities and verbal memory, using educational attainment as the covariate.

There 3 music attainment groups differed significantly in overall musical ability ($F(12, 158) = 3.55, p < 0.05$, Wilks' $\lambda = 0.62$, partial eta squared = 0.21) and verbal memory ability ($F(4, 166) = 3.70, p < 0.05$, Wilks' $\lambda = 0.84$, partial eta squared = 0.08). However, only the highly-trained musicians performed significantly better than the controls in both music and immediate verbal memory recall (see Table 1).

There were no significant differences between the early and late learners in overall musical ability, ($F(6, 35) = 2.11, p > 0.05$, Wilks' $\lambda = 0.74$, partial eta squared = 0.27) and verbal memory ($F(2, 39) = 1.94, p > 0.05$, Wilks' $\lambda = 0.91$, partial eta squared = 0.09) (Table 2).

Current learners marginally differed significantly from non-current learners in overall musical ability ($F(6, 35) = 2.33, p = 0.05$, Wilks' $\lambda = 0.72$, partial eta squared = 0.29) but not verbal memory ($F(2, 39) = 1.77, p > 0.05$, Wilks' $\lambda = 0.92$, partial eta squared = 0.08) (Table 3).

Table 1
Means and (s.d.) of Musical and Verbal Memory subtests with respect to Musical Attainment

	Skilled (n=23)	Amateur (n=20)	Control (n=45)	Diff
Melodic- Scale	28.43 (1.7)	27.50 (2.24)	26.51 (3.20)	
Melodic- Different contour	28.87 (1.58)	27.00 (2.20)	25.84 (3.47)	s>c
Melodic- Same contour	28.35 (2.31)	26.70 (3.48)	24.53 (3.26)	s>c
Temporal- Rhythmic	28.96 (1.66)	27.85 (2.03)	25.64 (3.7)	s>c
Temporal- Metric	29.96 (0.21)	27.90 (2.53)	24.18 (4.84)	s>c
Incidental Music Memory	29.13 (1.1)	27.30 (3.25)	25.71 (2.83)	s>c
WMS-VPA (immediate)	12.57 (3.41)	12.30 (2.94)	10.24 (2.85)	s>c
WMS-VPA (delay)	11.52 (2.57)	11.95 (1.99)	10.78 (2.37)	

Table 2
Means and (s.d.) of Musical and Verbal Memory subtests in Early and Late Learners

	Early (≤7) (n=20)	Late (after 7) (n=23)
Melodic- Scale	28.25 (1.83)	27.78 (2.15)
Melodic- Different contour	28.25 (1.89)	27.78 (2.28)
Melodic- Same contour	27.35 (2.18)	27.78 (3.59)
Temporal- Rhythmic	28.35 (1.87)	28.52 (1.97)
Temporal- Metric	29.45 (2.01)	28.61 (1.95)
Incidental Music Memory	29.20 (1.11)	27.48 (3.07)
WMS-VPA (immediate)	12.70 (3.84)	12.22 (2.50)
WMS-VPA (delay)	11.35 (2.76)	12.04 (1.82)

Table 3
Means and (s.d.) of Musical and Verbal Memory subtests in Current and Non-Current Learners

	Current (n=25)	Non-Current (n=18)	Diff
Melodic- Scale	28.64 (1.78)	27.11 (2.00)	
Melodic- Different contour	28.88 (1.51)	26.78 (2.21)	c>n
Melodic- Same contour	28.52 (2.29)	26.28 (3.41)	
Temporal- Rhythmic	29.08 (1.66)	27.56 (1.92)	
Temporal- Metric	29.84 (0.62)	27.83 (2.62)	c>n
Incidental Music Memory	29.04 (1.24)	27.22 (3.35)	
WMS-VPA (immediate)	12.84 (3.45)	11.89 (2.72)	
WMS-VPA (delay)	11.68 (2.53)	11.78 (2.02)	

Discussion

Taking into account educational attainment, highly-trained musicians demonstrated better musical ability and immediate verbal memory recall, illustrating the relevance of music attainment in verbal memory development.

However, there was no effect of AOA in verbal memory scores, possibly because most of the late learners received formal music training at an early age. Future studies can recruit late learners who acquire formal music training after the age of 12 with high and low music qualification. Current learners, though had better musical ability, did not have better verbal memory.

The results reinforced the relationship between high music attainment and verbal memory. Nevertheless, how various music learning conditions interact with verbal memory remains open for further investigation.

References

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